





From the INTERNATIONAL SEARCHING AUTHORITY

To: .		PCT				
see form PCT/ISA/220		WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43 <i>bis</i> .1)				
		Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)				
Applicant's or agent's file reference see form PCT/ISA/220		FOR FURTHER ACTION See paragraph 2 below				
International application No. PCT/GB2004/002668	International filing date (c 21.06.2004	day/month/year)	Priority date (day/month/year) 21.06.2003			
International Patent Classification (IPC) or both national classification and IPC H02K5/132, H02K9/19, F04D13/10						
Applicant WEATHERFORD/LAMB, INC.			·			
This opinion contains indications relating to the following items:						

☑ Box No. I Basis of the opinion

Box No. II Priority

Mon-establishment of opinion with regard to novelty, inventive step and industrial applicability

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial

applicability; citations and explanations supporting such statement

☐ Box No. VI Certain documents cited

Box No. VII Certain defects in the international application

Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

9)

European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 Authorized Officer

Frapporti, M

Telephone No. +49 89 2399-2243







10/562073 GB0402668

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/GB2004/002668

AP20 320'6 PCT. PTO 21 DEC 2005

	Box N	I Basis of the opinion	_
1.	With re	ard to the language , this opinion has been established on the basis of the international application in uage in which it was filed, unless otherwise indicated under this item.	
	la	opinion has been established on the basis of a translation from the original language into the following plage , which is the language of a translation furnished for the purposes of international search der Rules 12.3 and 23.1(b)).	g
2.	With reneces	ard to any nucleotide and/or amino acid sequence disclosed in the international application and ry to the claimed invention, this opinion has been established on the basis of:	
	a. type	f material:	
		a sequence listing	
		able(s) related to the sequence listing	
	b. form	t of material:	
		n written format	
		n computer readable form	
	c. time	f filing/furnishing:	
		ontained in the international application as filed.	
		led together with the international application in computer readable form.	
		urnished subsequently to this Authority for the purposes of search.	
3.	ha co	ddition, in the case that more than one version or copy of a sequence listing and/or table relating thereto been filed or furnished, the required statements that the information in the subsequent or additional es is identical to that in the application as filed or does not go beyond the application as filed, as copriate, were furnished.	o

4. Additional comments:









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_	Воз	x No. II	Priority
1.	\boxtimes	The fol	lowing document has not been furnished:
		\boxtimes	copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
			translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).
		Consec neverth	quently it has not been possible to consider the validity of the priority claim. This opinion has neless been established on the assumption that the relevant date is the claimed priority date.
2.		has be	binion has been established as if no priority had been claimed due to the fact that the priority claim en found invalid (Rules 43 <i>bis</i> .1 and 64.1). Thus for the purposes of this opinion, the international ate indicated above is considered to be the relevant date.
3.		was no	ot been possible to consider the validity of the priority claim because a copy of the priority document tavailable to the ISA at the time that the search was conducted (Rule 17.1). This opinion has been established on the assumption that the relevant date is the claimed priority date.
4.	Add	litional o	bservations, if necessary:









WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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	Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability						
	The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:						
	the entire international application,						
\boxtimes	claims Nos. 6-26						
be	cause:						
	the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):						
	the description, claims or drawings (indicate particular elements below) or said claims Nos. are so unclear that no meaningful opinion could be formed (specify):						
	the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.						
\boxtimes	no international search report has been established for the whole application or for said claims Nos. 6-26						
	the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:						
	the written form		has not been furnished				
			does not comply with the standard				
	the computer readable form		has not been furnished				
			does not comply with the standard				
	the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.						
	See separate sheet for further	detail	ls				









WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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					_					
_	Box	k No. IV	Lack of unity of	inventio	n					
1.	\boxtimes	In resp	oonse to the invitatio	n (Form f	PCT/ISA/20	6) to pay a	additional fees	, the applicar	nt has:	
			paid additional fee	S.						
			paid additional fees	s under p	rotest.					
		\boxtimes	not paid additional	fees.						
2.		☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.								
3.	This	s Author	rity considers that th	e requirei	ment of un	ity of inven	tion in accorda	ance with Ru	le 13.1, 13.2	and 13.3 is
		complie	d with		·					
	⊠ r	not com	plied with for the fol	owing rea	asons:					
		see se	parate sheet							
4.	Con	sequen	tly, this report has b	een estat	olished in r	espect of t	he following pa	arts of the int	ernational ap	plication:
	□ all parts.									
	⊠t	he parts	s relating to claims N	los. 1-5						
	Box	No. V ustrial a	Reasoned stater applicability; citation	nent und ons and e	er Rule 43 explanatio	B <i>bis</i> .1(a)(i) ns suppor	with regard t	o novelty, interest	nventive step	p or
1.	Stat	ement								
	Nov	elty (N)		Yes: No:	Claims Claims	1-5				
	Inve	entive st	ep (IS)	Yes: No:	Claims Claims	1-5				
	Indu	ıstrial a	oplicability (IA)	Yes: No:	Claims Claims	1-5				
2.	Cita	tions ar	nd explanations							

see separate sheet







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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (SEPARATE SHEET)

International application No.

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Re Item IV.

AP20 Racid PCT/PTO Z L DEC 2005

The separate inventions/groups of inventions are:

Invention I (claims 1-5)

A downhole electric motor having a permanent magnet rotor and a stator with windings in closed slots. The windings are cooled in the slots.

Invention II (claims 6-12,13-20)

A downhole electric motor having a stator being made up of first and second concentric parts which together define the slots in the stator so as to permit the phase windings to be fitted to the first part prior to fitting of the second part to enclose the phase windings within the slots.

Invention III (claims 21-23)

A downhole electric motor having two multiple-phase sections being supplied with electrical power from the surface by separate supply leads.

Invention IV (claims 24, 25)

A method of constructing the phase coils of a downhole electric motor.

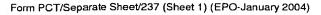
Invention V (claim 26)

A permanent magnet motor having permanent magnets provided with an anti-corrosion coating.

The reasons for which the present application has been deemed to contain 5 inventions which are not linked such that they form a single general inventive concept, as required by Rule 13.1,13.2 and 13.3 PCT are as follows:

The closest prior art has been identified as document D1 (US-B-6388353) which discloses a downhole electric motor (cf. column 3, line 60 - column 4, line 44).











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Invention I (claims 1 - 5):

From a comparison of the disclosure of this prior art D1 and the technical features of claim 1 the features which are known from D1 are the following:

- A downhole electric motor (16) (column 1, lines 6 9)
- having at least three phases and comprising a permanent magnet rotor (58) (column 2, lines 62 65) and
- a stator (52) bearing phase windings (54) in slots in the stator (column 4, lines 2 7),
- each phase winding (54) incorporating a plurality of coils each extending through a respective pair of closed stator slots (Fig.3)

from which analysis follows that the following technical features of claim 1 can be seen to make a contribution over this prior art:

- the coils surrounds a respective portion of the stator between the stator slots (not explicitly mentioned in D1) and
- adjacent coils of different phases extending through opposite parts of a respective one of the stator slots.

From these features the objective problem to be solved by the first invention can be construed as:

How to install the different stator coils in the stator slots.

Invention II (claims 6 - 12 and 13 - 20):

From a comparison of the disclosure of the prior art D1 and the common technical features of independent claims 6 - 9 and 13 - 14 the features which are known from D1 are the following:

- A downhole electric motor (16) (and a method of constructing it) (column 1, lines 6 9)
- having a rotor (58) and a stator (52) bearing phase windings (54) in slots in the stator (column 4, lines 2 7),











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from which analysis follows that the following technical features of independent claims 6 - 9 and 13 - 14 can be seen to make a contribution over this prior art:

the stator being made up of first and second concentric parts which together define the slots in the stator so as to permit the phase windings to be fitted to the first part prior to fitting of the second part to enclose the phase windings within the slots.

From these features the objective problem to be solved by the second invention can be construed as:

How to form the stator of an electric motor.

Invention III (claims 21 - 23):

From a comparison of the disclosure of the prior art D1 and the technical features of independent claim 21 the features which are known from D1 are the following:

- A downhole electric motor (16) (column 1, lines 6 9)
- having a first multiple-phase section (column 2, lines 62 65)

from which analysis follows that the following technical features of claim 21 can be seen to make a contribution over this prior art:

- a second multiple-phase section and
- separate supply leads for supplying said first and second sections with electrical power from the surface.

From these features the objective problem to be solved by the third invention can be construed as:

How to group the windings of an electric motor and supply them with electrical power.

Invention IV (claims 24 - 25):

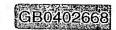
From a comparison of the disclosure of the prior art D1 and the technical features of independent claim 24 the features which are known from D1 are the following:











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- A method of constructing a downhole electric motor (16) (column 1, lines 6 9)
- having a rotor (58) and a stator (52) bearing phase coils (54) in slots in the stator (column 4, lines 2 7),

from which analysis follows that the following technical features of claim 24 can be seen to make a contribution over this prior art:

- the method comprising the step of fitting open ended conductive loops within the slots in the stator, and
- closing the conductive loops to form the phase coils.

From these features the objective problem to be solved by the forth invention can be construed as:

How to manufacture the phase coils of an electric motor.

Invention V (claim 26):

From a comparison of the disclosure of the prior art D1 and the technical features of independent claim 26 the features which are known from D1 are the following:

- A permanent magnet motor (16) (column 1, lines 6 9)
- having a rotor (58) provided with permanent magnet means (74) (column 4, lines 28 - 30) and
- a stator (52) coaxial with the rotor (58) (column 4, lines 8 10),

from which analysis follows that the following technical features of claim 26 can be seen to make a contribution over this prior art:

- wherein the permanent magnet means is provided with an anti-corrosion coating.

From these features the objective problem to be solved by the fifth invention can be construed as:

How to form the rotor of an electric motor.

The five identified inventions do not share any common special technical features within



29-12-2004







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the meaning of Rule 13.2 PCT, because as the analysis clearly shows, the above identified features of invention I establishing a difference to the closest prior art are neither the same as nor corresponding to those of invention II, nor the same as or corresponding to those of invention IV, nor the same as or corresponding to those of invention V.

Also examining the possible correspondence by technical effect, one finds the technical effect of :

- invention I to be the possibility of providing cooling means between the windings in the slots,
- invention II to be the possibility of providing the stator with prefabricated coils,
- invention III to be the provision of a fault-tolerant downhole electric motor,
- invention IV to be the easy manufacturing of coils for stators having closed slots,
- invention V to be the possibility of using the motor in an aggressive environment.

This appears to show lack of corresponding technical effect as well. Consequently, neither the objective problem underlying the subjects of the three claimed inventions, nor their solutions defined by the technical features allow for a relationship to be established between the said inventions, which involves a single general inventive concept.

In conclusion, therefore, the five groups of claims are not linked by common or corresponding special technical features and define five different inventions not linked by a single general inventive concept. The application, hence does not meet the requirements of Unity of Invention as defined in Rules 13.1 & 13.2 PCT.

If the applicant pays additional fees for one (or more) not yet searched group(s) of invention(s), then the further search(es) may reveal further prior art that gives evidence of a further lack of unity 'a posteriori' within one (or more) of the not yet searched group(s). In such a case only the first invention in this (each of these) group(s) of inventions, which is considered to lack unity of invention, will be the subject of a search. No further invitation to pay further additional fees will be issued. This is because Article 17(3)(a) PCT stipulates that the ISA shall establish the International Search Report on those parts of the international application which relate to the invention first mentioned in the claims ('main invention') and for those parts which relate to inventions in respect of which the additional fees were paid. Neither the PCT nor the PCT guidelines provide











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a legal basis for further invitations to pay further additional search fees (W17/00, point 11 and W1/97, points 11-16).

Re Item V.

1) The following documents are referred to in this communication:

D1: US 6 388 353 B1 (LIU JOSEPH C ET AL) 14 May 2002 (2002-05-14)

D2: EP 1 102 383 A (NISSAN MOTOR) 23 May 2001 (2001-05-23)

D3: DE 28 26 607 A (BBC BROWN BOVERI & CIE) 29 November 1979 (1979-11-29)

2) The present application does not meet the criteria of Article 33(1) PCT, because the subject matter of claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

Document D1, which is considered to represent the most relevant state of the art to the subject matter of claim 1, discloses (the references in parenthesis applying to this document):

- A downhole electric motor (16) (column 1, lines 6 9)
- having at least three phases and comprising a permanent magnet rotor (58) (column 2, lines 62 65) and
- a stator (52) bearing phase windings (54) in slots in the stator (column 4, lines 2 7),
- each phase winding (54) incorporating a plurality of coils each extending through a respective pair of closed stator slots (Fig.3)

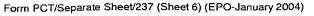
from which the subject-matter of claim 1 differs in that:

- the coils surrounds a respective portion of the stator between the stator slots (not explicitly mentioned in D1) and
- adjacent coils of different phases extending through opposite parts of a respective one of the stator slots.

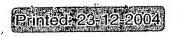
The problem to be solved by the present invention may therefore be regarded as how to install the different stator coils in the stator slots so that cooling means may be provided in the slots between the windings.

In view of D2 the solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following













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reasons:

The solution proposed in claim 1 has already been employed for the same purpose in a similar motor, see document D2, column 3, lines 1 - 45. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to a motor according to document D1, thereby arriving at a Motor according to claim 1.

3) Dependent claims 2 - 5 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

The features of dependent claim 2 have already been employed for the same purpose in a similar motor, see document D2, column 3, lines 1 - 45. It would therefore be obvious to the person skilled in the art, to apply these features with corresponding effect to a motor according to document D1, thereby arriving at a motor according to claim 2.

The same applies also to claim 3 taking into consideration document D1 and D3.

In claims 4 and 5 slight constructional changes in the motor of claim 1 is defined which comes within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen. Consequently, the subject-matter of claims 4 and 5 also lacks an inventive step.

With reference to his letter dated 12 July 2004 the applicant is informed that the missing figure Fig.31 cannot be constructed unambiguously from the explanations given in the description. Therefore Fig.31 cannot be reinstated without adding any further subject matter to the application as originally filed (Article 19(2) and 34(2)(b) PCT).

